PRACA POGLĄDOWA
REVIEW ARTICLE

THE PROBLEM OF ORTHODONTIC TREATMENT OF PATIENTS WITH HEARING DIFFICULTY (LITERATURE REVIEW)

PROBLEMY LECZENIA ORTODONTYCZNEGO U CHORYCH Z KŁOPOTAMI ZE SŁUCHEM (PRZEGLĄD LITERATURY)

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ABSTRACT

Results of review of native and foreign publications based on the problem of dental and orthodontic aid to patients with hearing difficulty are presented in this article. Hearing loss affects the ability of a person to communicate with other people. Depriving of opportunities for communication can have a significant impact on everyday life, causing feelings of loneliness, isolation and despair. Spread of dentofacial abnormalities in people with hearing difficulties is very high. Problem of dental aid to patients with hearing difficulties especially with orthodontic one is very topical.

KEY WORDS: orthodontic treatment, malocclusion, deaf people, children with hearing difficulties, caries

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INTRODUCTION

Children's and teenager's health is the main component which reflects the social and economic situation in the state and it is an indicator of well-being [1].

Today dentofacial defects (abnormalities) are the most common among all dental diseases [2], and timely detection of orthodontic pathology and the use of the most effective methods of preventive measures and treatment is the component of time.

Dentofacial system is difficult and unique mechanism in person's organism. Diseases of ears, nose and throat, digestive tract, endocrine and skeletal system, hereditary factors and traumas can cause abnormalities of dentofacial system. In this turn according to subjective and objective criteria timely normalization of occlusion and elimination of myofunctional problems of dentofacial area causes the improvement of general condition [3]. Functional hearing difficulty is one of the factor which causes dentofacial pathologies in children's age [4].

Hearing ability is an important component since the birth and decreased hearing ability and hearing loss can cause retardation and complete absence of speech development and affect his/her intellectual and psychological development and it doesn't allow developing completely and complicates communication with people and isolates from society [5, 6, 7]. So, the problem of deafness in children is global and important in the world [8].

REVIEW AND DISCUSSION

Deaf people contain one of the biggest groups of handicapped ones. According to WHO in 2001, 250 millions had disability that was connected with hearing loss. 7-9 % of population suffers from decreased hearing, from 0,1 to 0,4 % of newborn children suffer from deafness, and about 1 % of adults also have such problem in economically developed countries of world, also in the USA and countries of Western Europe. In Switzerland more than 650000 people have problems with hearing and 10000 deaf people use the language of gestures [9]. Annually, in Turkey 500 children are born with hearing difficulties and special education is received only by 5,46% of such children. According to WHO information number of people with hearing difficulties to 2020 will increase on 30 % [10].

Accurate data of number of deaf children in Ukraine have not found by us. 300 thousand of children who suffer from hearing difficulty and 1 million of people and 11 thousands of children and 100 thousands of adults with deafness were presented in 2008 [11]. In 2013 children's disability of ear disease and papillary process occupied the fifth place. During 2006 – 2013 the total number of children who have hearing difficulty increased from 8,55% to 9,4% [5].

The main component of people's communication with hearing difficulty is non-verbal communication and it creates the barrier during communication. Deaf people have their own gesture language and culture [12]. Brazilian scientists propose the development of programmes of specialist's training in state institutions to give proper aid to deaf patients such as verbal communication which is created by sign systems [9].

Such scientists as Tarasov D.I., Nasedkin A.N.(in the field of audiopsychology) decided that all causes and factors of

hearing difficulties should be divided into three groups. The first group contains causes and factors that cause the development of hereditary deafness or problems with hearing. The second group contains factors that affect the fetus during pregnancy and cause general intoxication of mother's organism during this period (congenital hearing difficulty). The third one presents factors which affect children's ear during the life (acquired hearing difficulty) [13].

Hearing difficulty after child's delivery with normal functioning hearing can be various. Conductive or neurosensorial pathology can be depending on the pathological influence of hearing organ. The stage of hearing change from minor deafness to complete one depends on pathogenic factor and time. Mixed stage of hearing difficulty is during damage of signal and signal perception areas of hearing apparatus [14].

The significant difference of dental diseases in handicapped children of different groups has not revealed but in comparison with ordinary children they have higher level of morbidity and receive lesser attention from dentists [15].

Scientists from different countries are interested in the study of peculiarities of dental health and dental aid to children and teenagers. Timely and effective medical and dental aid to children, teenagers and adults who have hearing difficulties is important public problem [16].

Indices of caries are high and vary from 53,6% to 95,75%, and depend on the country and age of examined [17,18]. Rahman N. A. and others consider that caries spread in children and adults in Malaysia with hearing disorder contains 88,0% and 85,0% [19]. In Russia indices of spread caries in adults who suffer from deafness are maximal 100 %. [20]. Al-Qahtani Z. considers that in group of 6–7-years old deaf children in Saudi Arabia the caries spread contains 95,7%, and in children of 11–12 years old — 93% at intensity 7,35 and 5,12 correspondingly [18].

Index of carious permanent teeth, filled teeth, removed permanent teeth and carious temporary teeth and filled temporary teeth is high one. Age group which contains children who are 6-11 years old component carious of temporary teeth prevails (84,4%) and index of carious permanent teeth is (84,6%). Children who are 12–18 years old component contains 90,2%, and index of filled teeth only contains 9,8% [21]. Untimely sanation of oral cavity causes to immature removed temporary teeth (to 6 years). It contains 7% [21]. Only 3,1% of deaf children who are from 7 to 14 years old and they do not require dental aid [19].

The necessity of teeth treatment in deaf children is very high and reaches to 90,1% [22], but people who are from 5-22 years old applied to dental help and only 7,14% of deaf people [23]. In 73% of cases in deaf people acute carious process is developed [24].

Oral hygiene is one of factors that cause caries development. In comparison with healthy children in deaf ones there is poor oral hygiene and poor manual skills. So, Semra Ciger, according to results major part of deaf people aged 10-24 years in Turkey have poor level of oral hygiene and there is dental plaque on teeth. [10]. Sokolova I.I. indicates that in major part of observed children in Ukraine with neurosensory hearing problem hygienic condition of oral cavity is satisfactory [24]. Vichayanrat T. proves that in Thailand poor oral hygiene is present in 42,2% of children with poor hearing and deaf children and in 51,8% of children with normal functioning hearing, so as scientist considers that influence the level of caries occurs as a consequence of poor education of parents and poor oral hygiene. Besides, oral hygiene depends on age and economic status of parents [17]. Deaf patients require proper control and periodic dental examinations and they do not have sufficient knowledge about correct oral hygiene and preventive measures of dental diseases and 94 % brush teeth once a day [25].

High frequency of fruity juices, sweets and carbonated soft drinks also presents the risk group of caries. [26].

Malaysian and Ukrainian scientists believe that 30,9% of observed patients with hearing difficulties have inflammatory process of gingival papillae with hyperemia, swelling, bleeding, but without damage of dental and gingival connection [21, 27].

Examined deaf teenagers in Nigeria more than 90% were ready to take dental examination, but only 12% received dental aid [25].

In children with congenital deafness dysbalance in system of lipid perioxidation and in antioxidative system was determined. The number of secretory immunoglobulin A and activity of lysozyme are lower and activity of urease and the level of dysbiosis are higher in comparison with healthy children that negatively affect protective layers of tissues of oral cavity. Microecology of dental plaque in such children determines significant peculiarities of quantative and qualitative content of microbiocenosis. Elimination of carious strains S.mutans was statistically often and it is unfavorable prognostic criterion. In children with congenital deafness, activity of salivary glands is decreased: decreased speed of salivation decreased indices of pH and impaired local immunity of tissues of oral cavity [28,29,30].

Sokolova I.I. proves that impairment of psychological, immunological and biochemical properties of oral liquid causes the development of dysbiosis of oral cavity and plays an important role in development of dental diseases [24,28,29,30,31]. But, Rahman N. A. indicates that spread of caries in Malaysia of children who are 7 – 14 years old doesn't depend on pH of saliva, middle index of which is 6,8 [19].

European and Russian scientists could not determine the spread of dentofacial abnormalities (2003-2013pp.) in children with hearing difficulties. Indices of presented data range from 19% to 88,5% [10,16,32,33], that require further investigations.

More than 40 years later in native literature was proved that defect of development of dentofacial system occurs more often than in healthy children: in mixed bite – 51,6±0,46%, in permanent one – 49,0±0,36 [34]. Croatian scientist Brozd-Topolkko J. member of European orthodontists 30 years later confirmed that orthodontic problems of dentofacial abnormalities occur on 12,65% more often, than in children with normal hearing [35], but in 15 years Chinese scientist Zhang H.P.did not find

statistical difference between deaf children and healthy ones and he considers that in both groups spread of dentofacial abnormalities is 60%, and deafness did not affect peculiarities of bite. [36].

There is not one thought among scientists about the most widespread pathology of bite (malocclusion) in deaf children and adults.

Barynova L.P. confirmed that pathology of the second group was present in deaf children. (20,5±0,18% in mixed bite and 20,8±0,21% in permanent one [34]. In 28 years Polyanyk N.Ya. confirms this concept and thinks that this case can be present in 2 times more often such as ,0±3,53% [37].

Opposite data is presented by Kulahina N.I. (2003p.), who considers that in the structure of dentofacial abnormalities in mixed bite there are transversal and vertical defects: deep (23,81±5,32%), open (17,24±6,35%), and crossed (11,13±5,32%). Based on her idea, pathology of the second group is present in 5,7±3,93% – 6,34±2,45%, and in permanent bite abnormalities of the first group by Angle's classification are present (84,5%) and pathologies of the structure of hard tissues (32,8%) [33]. Semra Ciger confirms her data, who found out [10], that in Turkish deaf children who are 10-24 years old of dentofacial abnormalities of the group by Angle's classification are present in 75%, the second class of pathologies includes 13%, teeth crowding contains 20,6%, and diastema occurs in 18,7% [10]. There are abnormalities of shape, position, number and size of some teeth in patients with hearing difficulties (in 99,0±0,71%). The author insists on palate formation in children with hearing difficulties differs from normal one as signs of pitting of the upper and lower teeth positioning [37]. Dentoalveolar form (82,2%) of orthodontic pathologies and defects is prevalent one [32].

It is known that the absence of speech articulation affects negatively the development of dentofacial apparatus of deaf children. "Tongue behavior" of deaf children is different from healthy ones. It was proved by method of cinefluorography. The important fact was observed during research that all deaf children have lesser flexible body of the tongue during speech and similar trajectory of its movement [38].

In 1975 L.P. Barynova pointed out that important pathogenetic factor of formation of dentofacial complex is speech function, because tongue is strong muscular organ and has influence on the formation of dentofacial system so the study of its shape and position in the oral cavity presents practical interest. In children with hearing difficultics, in saggital abnormalities of bite in physiological rest position of masticatory muscles, tongue position was determined which can strengthen bite defects [34,39]. Abnormal tongue functions can lead to morphological changes even at normal bite and intensifies malocclusion [40]. Deaf patients do not use facial muscles during the speech, electromyographic activity of masticatory muscles and orbicular muscle of mouth is noticed in comparison with children with healthy hearing [41].

Small vestibule of the mouth in 25%, and ankylo-glossia in 8,2% cases was found in children with hearing difficulties of Ukraine [21], in deafmutes in China upper lip tie was observed in 6,7% (in people with normal hearing in 4,8%) [36]. The possibility of formation of small vestibule of the mouth in DIC contains 12,1±2,32%, ankylo-glossia is presented in 51,5±3,55%, high attachment of lower lip tie is observed in 34,3±3,37%, lateral bands – in 8,1±1,94%, and they increase with age [37].

Among children's harmful habits finger sucking is present in children who are 4-6 years old and in 4,24% [10], during the period of mixed bite in 20% of children with hearing difficulties infantile type of swallowing is observed and in children who are more than 12 years old oral type of breath was present (11,5%), decrease of muscles tonus of perioral area [32].

But people with hearing difficulties require orthodontic aid and they apply to dentist very rarely. So, among 213 examined deaf people in Turkey aged from 10 to 24 none-one received orthodontic aid [10].

It is important that 81% of deaf people were satisfied aesthetics of their smile and they had orthodontic pathology [10].

It was demonstrated that doctor's management with such children plays an important significance [42]. Two thirds of English children with hearing difficulties (63%) had communicative problems with dentists. It was determined by Champion J. by the method of quiz in 2000. [43]. Australian scientists think that this problem can be present because such patients feel neglecting, indifference and misunderstanding [15]. Obtained questionnaire of deaf people and people with poor hearing indicates only 59% of examined understand doctors completely but almost half of dentists (45,3%) are ready to give aid to children with sensory hearing deprivation [42].

Dentists also notice difficulties during dental aid to deaf patients. Successful communication of dentists with deaf patients has important significance for effective help, especially orthodontic one [12,44].

During visit of deaf people a dentist meets with difficulties [16]. Deaf patient can't give complaints during dental visit, necessary information about health condition, past and concomitant illnesses and others. It is difficult to understand patient's complaint, explain the significance of dental intervention, its stages and possible complications, propose possible alternative variants of treatment [42]. It should be noted that patients who have hearing difficulties visit dentist with people who can be as an instructor and use nonverbal methods. Medical face mask is barrier during communication with people who have hearing difficulties and it is necessary to explain any procedure and after that to wear face mask. Children with hearing difficulties in comparison with healthy patients are prone to be excited and they require explanation and demonstration [45]. Mimic reactions which characterize emotional status of patients can demonstrate the condition of the patient [46]. Children with hearing difficulties do not like long-lasting dental procedures and they should be done quickly. Medical staff should explain information by simple sentences [47].

Children and adults with hearing defects have problems with medical institutions because special communicative needs are not considered, and medical staff is not prepared.

CONCLUSIONS

Review of modern native and foreign literature allows concluding that problem of dental aid to patients with hearing difficulties especially with orthodontic one is very topical. Unfortunately, in studied literature data of bite pathology (malocclusion) and structure of dentofacial abnormalities and defects in children with hearing difficulties is complex and opposite. But received information indicates that spread of dentofacial abnormalities in people with hearing difficulties is very high.

It was established that there is not specific system for dental orthodontic aid to this group of patients. Nowadays problem of the development of highly-qualified, economical and realistic programmes to create for prevention of dental disease and malocclusion, programmes of hygienic education and sanitary work among patients with hearing difficulties is actual and requires great attention to world dental education and practice.

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